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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/804,353 | 03/18/2004 | Robert Rozbicki | NOVLP024X2/NVLS-2852 | 9231 |
| 22434 | 7590 | 03/23/2006 | EXAMINER | |
| BEYER WEAVER & THOMAS LLP | | | GURLEY, LYNNE ANN | |
| P.O. BOX 70250 | | | ART UNIT | |
| OAKLAND, CA 94612-0250 | | | PAPER NUMBER | |
| | | | 2812 | |

DATE MAILED: 03/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/804,353

Applicant(s)

ROZBICKI ET AL.

Examiner

Lynne A. Gurley

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

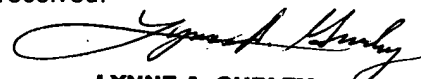
Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.


LYNNE A. GURLEY
PRIMARY PATENT EXAMINER
TC 2800, AU 2812

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to the amendment filed 1/3/06.

Currently, claims 1-23 are pending.

Specification

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-2, 6-8, 16-19, 21-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Gopalraja et al. (US 6,274,008, dated 8/14/01, filed 10/2/00).
4. Gopalraja shows the method as claimed, in figures 14-16, as: (a) etching the bottoms of recessed features (218/212; figs. 14-15) on a surface of the substrate 210 to clean at least part of an underlying metal while simultaneously depositing a first portion of a diffusion barrier on at least sidewalls of recessed features (fig. 15); (b) depositing a second portion of the diffusion barrier 228, which covers at least the bottoms of the recessed features; and (c) depositing the

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metal conductive layer (column 14, lines 18-30) over the surface of the substrate. Preclean is not necessary (column 5, lines 1-4).

5. Claims 1-2, 6-8, 16-17 and 21-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Hashim et al. (US 6,287,977, dated 9/11/01, filed 7/31/98).

6. Hashim shows the method as claimed in figures 1-10 and corresponding text, with emphasis on figures 4A-4D, as: (a) etching the bottoms of recessed features (55/57; fig. 4A) on a surface of the substrate to clean at least part of an underlying metal while simultaneously depositing a first portion of a diffusion barrier on at least sidewalls of recessed features (fig. 4B); (b) depositing a second portion of the diffusion barrier 61, which covers at least the bottoms of the recessed features; and (c) depositing the metal conductive layer (57b) over the surface of the substrate.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
10. Claims 3-5, 9-15, 20 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gopalraja et al. (US 6,274,008, dated 8/14/01, filed 10/2/00).
11. Gopalraja shows the method substantially as claimed, and as described in the previous paragraphs.
12. Gopalraja lacks anticipation only in not teaching an additional etching step for the barrier layer; a degas operation prior to (a); aspect ratios; a hollow cathode magnetron processing chamber; heating while degassing; depth of the etching of the bottom of the recessed features; etch-to-deposition ratio; thicknesses; claimed power ranges; and flow rates.
13. It would have been obvious to one of ordinary skill in the art to have had a degas operation prior to (a); the claimed aspect ratios; a hollow cathode magnetron processing chamber; heating while degassing; the claimed depth of the etching of the bottom of the recessed features; the claimed etch-to-deposition ratio; thicknesses; claimed power ranges; and flow rates, in the method of Gopalraja, with the motivation that a magnetron device is disclosed (column 1, lines 59-67; column 4, lines 48-53; column 6), so that the specific type of magnetron processing

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apparatus would be a matter of design choice; and, with the motivation that the additional claimed ranges and features are parameters of optimization to one of ordinary skill in the art.

14. Claims 3-5, 9-15, 18-20 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hashim et al. (US 6,287,977, dated 9/11/01, filed 7/31/98).

Hashim shows the method substantially as claimed, and as described in the previous paragraphs.

15. Hashim lacks anticipation only in not teaching an additional etching step for the barrier layer; a degas operation prior to (a); aspect ratios; a hollow cathode magnetron processing chamber; heating while degassing; depth of the etching of the bottom of the recessed features; etch-to-deposition ratio; thicknesses; claimed power ranges; and flow rates.

It would have been obvious to one of ordinary skill in the art to have had a degas operation prior to (a); the claimed aspect ratios; a hollow cathode magnetron processing chamber; heating while degassing; the claimed depth of the etching of the bottom of the recessed features; the claimed etch-to-deposition ratio; thicknesses; claimed power ranges; and flow rates, in the method of Hashim, with the motivation that a sputtering chamber is disclosed, so that the specific type of sputtering apparatus, including a magnetron sputtering apparatus, would be a matter of design choice; and, with the motivation that degassing is disclosed and the additional claimed ranges and features are parameters of optimization to one of ordinary skill in the art.

Response to Arguments

16. Applicant's arguments filed 1/3/06 have been fully considered but they are not persuasive. In response to Applicant's remarks, the deposition of the diffusion barrier appears to result from a metal sputtering process from a target.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See the PTO Form 892.

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

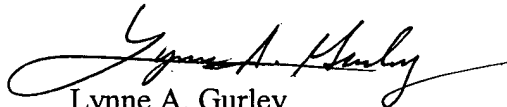
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne A. Gurley whose telephone number is 571-272-1670. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Lynne A. Gurley", is written over a horizontal line.

Lynne A. Gurley
Primary Patent Examiner
Art Unit 2812

LAG
March 20, 2006